

Kinematic Equation Example

An engineer is designing the runway for an airport. Of the planes which will use the airport, the lowest **acceleration** rate is likely to be **3 m/s²**. The takeoff **speed** for this plane will be **65 m/s**. Assuming this minimum acceleration, what is the minimum allowed **length** for the runway?

Step one - Identify key words done in Red

Step two - List variables and draw Pictures



$$V_i = 0$$

$$V_f = 65 \text{ m s}^{-1}$$

$$A = 3 \text{ m s}^{-2}$$

$$D = ?$$

Step three - Identify equations

Time taken to reach Acceleration value = ?

$$v_f^2 = v_i^2 + 2ad$$

Step four - insert values and rearrange

$$v_f^2 = 0^2 + 2(3) d$$

$$65^2 = 6d$$

$$65^2/6 = d$$

$$704 \text{ m} = d$$